The Impact of Tiered Physician Networks on Patient Choices

Anna D. Sinaiko and Meredith B. Rosenthal

Objective. To assess whether patient choice of physician or health plan was affected by physician tier-rankings.

Data Sources. Administrative claims and enrollment data on 171,581 nonelderly beneficiaries enrolled in Massachusetts Group Insurance Commission health plans that include a tiered physician network and who had an office visit with a tiered physician.

Study Design. We estimate the impact of tier-rankings on physician market share within a plan of new patients and on the percent of a physician's patients who switch to other physicians with fixed effects regression models. The effect of tiering on consumer plan choice is estimated using logistic regression and a pre–post study design.

Principal Findings. Physicians in the bottom (least-preferred) tier, particularly certain specialist physicians, had lower market share of new patient visits than physicians with higher tier-rankings. Patients whose physician was in the bottom tier were more likely to switch health plans. There was no effect of tier-ranking on patients switching away from physicians whom they have seen previously.

Conclusions. The effect of tiering appears to be among patients who choose new physicians and at the lower end of the distribution of tiered physicians, rather than moving patients to the "best" performers. These findings suggest strong loyalty of patients to physicians more likely to be considered their personal doctor.

Key Words. Tiered networks, consumer choice, providers, managed care, cost-sharing

In a tiered network, health insurers sort providers into tiers based on cost and quality performance, and patients have a financial incentive (they pay lower cost-sharing) to see a provider in a higher performing tier. Cost-efficiency is typically gauged using episode-level costs and utilization, while quality is judged through claims-based process measures, external certification, and, in some cases, use of health information technology (Draper, Liebhaber, and Ginsbug 2007; Oldenburg 2011). Tiered provider networks thus encourage consumers to choose "higher value" providers while maintaining consumer choice of provider. In addition, tiered networks may spur quality improvement and cost control by motivating providers to attain a higher tier-ranking.

Today, most major commercial health insurers offer a tiered network product, 20 percent of employers include a tiered provider network in their health plan with the largest enrollment (Brennan et al. 2008; Kaiser Family Foundation/Health Research and Educational Trust 2011; Kowalczyk 2011), and some state-level policy makers (e.g., Massachusetts, Minnesota, Maine) have required health plans to begin development of or offer tiered network products. The Massachusetts Group Insurance Commission (GIC), a quasi-state agency that provides health benefits to approximately 375,000 public employees, retirees, and their dependents, was one of the first large employers to implement tiered physician networks in all of its non-Medicare health plans. The impact of these tiered physician networks on the choice of physician and health plan among GIC members is the focus of this paper.

The potential impact of tiering on consumer behavior depends on two sources of influence: the effective price differences induced by the tiered copayments and the quality and cost information conveyed by tier status. Few studies have assessed consumer response to differences in cost sharing among providers. With regard to the informational mechanism, the literature suggests that there may be modest behavioral effects in response to the quality or value of information provided by tiered networks, especially to the extent that provider tier-rankings provide patients with new information about provider quality (Dranove and Sfekas 2008; Kolstad and Chernew 2009).

There is only one other published study of tiered provider networks and it evaluated the effect of hospital tiering on choice of institution. Findings for hospital choice were mixed, with no effect for some types of admissions and subpopulations (Scanlon, Lindrooth, and Christianson 2008). Our own preliminary work suggests that responses to physician tiering will vary according to the nature of the health problem for which physician services are sought and whether patients have seen the physician in the past (Sinaiko 2011).

To our knowledge, this is the first study of the impact of tiered networks on consumer choice of physician or of health plan. To assess whether patient decisions to see a physician were affected by tier-rankings of their physicians, we test whether physicians with preferred tier-rankings captured greater market share of new patient visits and have had a lower percentage of existing patients switch to other physicians than other physicians. It is also possible,

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due to the importance of physician network in health plan choice (Scanlon, Chernew, and Lave 1997; Kolstad and Chernew 2009), that instead of switching physicians, patients could respond to the introduction of tiered physician networks by instead changing health plans. Thus, we also test whether patients with nonpreferred physicians were more likely to switch plans than patients who have a relationship with a top- or middle-ranked physician.

DATA AND METHODS

GIC Tiered Physician Networks

The GIC tiered networks are based on a common database of performance profiles and a specialty designation for individual physicians that was developed using pooled data from all of the GIC's health plans to maximize sample size and to eliminate potentially confusing and conflicting performance measurement. The performance data include "efficiency scores" calculated using the Symmetry Episode Treatment Group methodology, which works by capturing the relevant claim level services associated with a patient's treatment, regardless of treatment location, to form clinically homogeneous episodes of care that are adjusted for patient severity and compared across providers (Optum Insight 2012). The performance data also include "quality scores" calculated by Resolution Health, Inc. using standard claims-based process measures of quality.[1] More specifically, claims data are reviewed to assess an opportunity for recommended care (e.g., identification of a diabetic patient) and whether such care was delivered (e.g., carried out an eye examination). The quality review only processes measures of ambulatory care quality that can be reliably captured through claims data. Rates of services that can be received at many sites of care and may not be captured by claims data (e.g., flu shots) are not analyzed.[2]

   After the initial year in which the structure of the tiered networks varied across health plans, in FY2009 the GIC required plans to use the common database of physician performance profiles to identify their highest and lowest performing physicians using a three-tiered model with thresholds of approximately 20 percent of physicians in the top tier, 65 percent classified in the middle, and 15 percent assigned to the bottom tier. All plans were required to use a similar two-stage methodology for assigning physician tier rankings, which considered quality performance first and then efficiency performance. Physicians with insufficient data or new doctors were assigned to the middle tier. Some variation in tiering methodology across plans persisted, likely because

plans had the option to use supplemental quality measures or to adjust efficiency performance scores to reflect their own contracted rates. As a result, a physician could have different tier-rankings across plans in the same year. All plans tiered physicians in the six specialties representing almost two-thirds of physician-driven medical spending: cardiology, endocrinology, gastroenterology, obstetrics/gynecology, orthopedics, and rheumatology. Plans could choose to implement tiered networks for additional specialties, and many did (Table S1). In FY2009, the range of office visit co-payments was $10–$15 for the preferred tier, $20–$25 for the middle tier, and $25–$35 for the worst-performing tier; copayments increased by $5–$10 at all levels in FY2010.

The GIC informed and educated its members about the tiered physician networks through the quarterly GIC newsletter (delivered to members via U.S. mail, distributed by agency human resources departments, and sent via e-mail), open enrollment publications and health fairs, and by training the benefits coordinators in offices across Massachusetts to answer questions. Individual health plans also distributed marketing and education materials. These efforts focused on demonstrating how the tiers could make a difference to members in their care-seeking decisions and informed members that tier-rankings were based on provider differences in efficiency, termed in the materials as "cost-effectiveness" and "quality," but did not provide more detail on the underlying performance measures or the methods by which tier-rankings were assigned.

Data

We obtained administrative enrollment data and claims data for all non-Medicare individuals enrolled in five of the six GIC health plans over July 2004–June 2010 (FY2005–FY2010). The claims data include patient age and gender, diagnosis code, and the providing physician's name, practice tax identifier, and tier-ranking. We also obtained the unique physician identifier and specialty designation for the providing physician on the claim for over 94 percent of the data in 2008–2010, 77 percent of the data in 2007, and 57 percent of the data in 2006 for five health plans; this is the same physician linking identifier and specialty designation used to construct the tiered provider networks in the GIC health plans.[3,4] For claims where the unique physician identifier variable was missing, we linked physicians across claims over time by matching on name and practice tax ID. Claims where we were unable to match on the combination of physician name and practice tax ID were dropped from the analy-

sis (6 percent of physician claims). We also excluded claims where there were, most likely because of coding errors in the claims, conflicting tier-rankings for a physician within a plan-year (3.5 percent of claims).

Physician Choice Analysis

We evaluated the effect of tier-rankings on a physician's market share of new patient visits ("new visit analyses"), and on the percent of a physician's existing patients who switched to other physicians ("physician loyalty analyses") following the introduction of three-tier tiered networks in FY2009. Analysis of patient choice of provider in FY2008, when plans' offered networks with two tiers, was conducted as a sensitivity analysis (see Appendix). We excluded all patients who switched health plans from our analyses of choice of physician so as to avoid potential bias from patient decisions to switch plans that were based (at least in part) on tiering.

The first set of analyses looks at whether patients who are choosing a new physician are differentially more likely to choose physicians with better tier-rankings. We identify "new visits" in FY2009 or FY2010; a "new visit" is defined as an office visit within a specialty in which neither the patient nor any other person in the patient's family had a visit in the previous 2 years.[5] The total number of "new visits" were summed by for each physician i in specialty s and plan j to get a total number of new visits for every tiered physician in each plan in each year (visits_{isj}). For each tiered physician each year, we calculated the market share of new visits in a plan as the number of a physician's new visits in that plan divided by the total number of new visits in our data in that specialty in that plan.

$$\text{Market\_share}_{isj} = (\text{visits}_{isj})/(\text{visits}_{sj}) \tag{1}$$

The second analysis considered how the tiered networks might impact a patient's existing relationship with a physician in FY2009 and FY2010. For each of these years t, we identified patients with two visits with a particular physician over a 3-year pre-period (i.e., any of years $t-3$, $t-2$, and $t-1$), one of which must be in the immediate prior year (i.e., year $t-1$), *and* a visit with the same specialist type in year t. We then identified which patients returned to see the same doctor versus those who switched to a new doctor in year t without returning to see their prior doctor again that year. We then sum for every physician by plan-year a count of the patients who returned to see them in year t and a count of those who switched to another physician, and cal-

culate the percent switched. We conducted two sensitivity analyses: first, we classified patients as having switched physicians only if they had a minimum of two visits with the new physician in a year. Second, we omitted "switches" that occurred in the last 6 months of a fiscal year, because these patients may have returned to see their existing doctor early in the next year. Because of insufficient sample size, we dropped the smallest plan from the loyalty analyses.

Our empirical strategy in the physician choice analyses exploited the fact that just over half of physicians included in tiered networks at more than one plan within a fiscal year had different tier-rankings across plans. Different tier-rankings may have resulted from plans' use of different thresholds to divide physicians between top and lower tiers. Plans with more selective or smaller networks may have ranked the same physician lower (in percentile terms) than a broad network simply because they excluded lower-performing physicians from the network. Plans also may have considered additional data on performance, as described above, which lead to differences in tier-rankings across plans.

Among physicians tiered in multiple tiered networks in a year, we analyzed physician i's market share of new patient visits in plan p and year t (equation (2)) and the percent of a physician i's patients who switch to another physician in plan p and year t (equation (3)) using linear regression models with robust standard errors:

$$\text{Mshare}_{ipt} = \beta_0 + \beta_1(\text{tier1}_{ipt}) + \beta_2(\text{tier3}_{ipt}) + \text{physician}_{it} + (\text{plan}_p \\ * \text{specialty}_i * \text{year}_t) + \epsilon_{ipt} \tag{2}$$

$$\%\text{switch}_{ipt} = \beta_0 + \beta_1(\text{tier1}_{ipt}) + \beta_2(\text{tier3}_{ipt}) + \text{physician}_{it} + (\text{plan}_p \\ * \text{specialty}_i * \text{year}_t) + \epsilon_{ipt} \tag{3}$$

Models included variables indicating if a physician's tier-ranking is tier1 (the best) or tier3 (the worst) in a plan-year, which are the key independent variables of interest. Physician-year fixed effects are added to control for potentially observable (e.g., through reputation) but unmeasured differences among physicians that may be correlated with tier status, and a full set of plan-specialty-year fixed effects to control for differences in benefit design and generosity, differences in access to physicians over time and across plans, and differences in plans' tiered networks structures across specialties. With the addition of these controls, the coefficient on the variable indicating a physician's tier-ranking is the effect of tiering. Models also were stratified by whether a physician was the likely source of "usual care" for a patient, defined

to include internal medicine, family practice, pediatrics and obstetrics/gynecology specialties, or was a "specialist" (all other tiered specialties), as patients are likely to choose these types of physicians differently (e.g., characteristics such as gender and language are more important in choice for usual care). Results are presented as predicted probabilities based on these models.

Plan Choice Analyses

The third set of analyses considers whether a patient's decision to remain enrolled in their health plan is affected by how that plan tiers a physician who they have seen previously. Analysis of plan choice used a preintervention–postintervention study design; the preintervention period was FY2007 and the postintervention period was FY2009–FY2010.[6] The study sample included patients in four of the GIC health plans who had one existing relationship with a physician, defined as having had two visits with that physician in the previous 2 years (i.e., $t - 2$ or $t - 1$), one of which occurred in the immediate prior year (year $t - 1$). Because of small sample size, we dropped the fifth plan from this analysis. We analyzed whether the probability that the patient switched health plans in year t varied in the postintervention period for patients whose physician was in the preferred tier versus the middle tier versus the lowest performing tier. Models were stratified by whether a patient had future visits with their doctor. Models were also stratified by whether a physician was a "usual care" physician or not, as defined above. In sensitivity analysis we considered the sample of patients who have multiple existing relationships with physicians, and we assessed whether the probability of switching plans varied for patients for whom all their physicians were tiered in the preferred tier by their health plan versus those with at least one nonpreferred physician (see Appendix).

We estimated logistic regression models where the dependent variable was a dichotomous indicator of whether a patient switched plans. Explanatory variables included the existing doctor's tier-ranking in year t, year fixed effects, and an interaction between tier-ranking and an indicator for the postintervention period. This interaction term measured the effect of tiering. We included tier-ranking (which was not actually known in the preperiod) of the chosen physician to avoid bias from the effect of unobserved characteristics of the physician, such as quality, that are correlated with tiering and that may affect patient behavior. The models also controlled for patient age categories, gender, whether the patient had a previous diagnosis in one of the 70 Centers for Medicare and Medicaid Services Hierarchical critical condition categories,

physician specialty, and plan fixed effects. We included plan-year fixed effects to control for individual plan differences in benefits (including premiums paid), tier structure, and physician network that may change over time. Standard errors were clustered at the physician level and results are presented as predicted probabilities based on these models.

RESULTS

Study Population

There were 171,581 individuals with at least one visit with a tiered physician in FY2007–FY2010. Descriptive statistics on the patients in the study sample who had a visit with a tiered physician in FY2009 are presented in Table 1.

Choice of Provider

Analyses of choice of provider suggest that being in the worst tier in a tiered network leads to lower market share of new patient visits for physicians (Table 2). Statistical estimates indicate that, across all physicians, a physician in the average-performing tier is predicted to get 0.57 percent of GIC patients

Table 1:   Descriptive Statistics of Study Sample, FY2009*

Female (%)	59
Percent with any CC (%)[†]	38
Plan enrollment (%)	
Plan 1	43
Plan 2	19
Plan 3	28
Plan 4	9
Plan 5	1
Age (%)[‡]	
0–17	19
18–30	13
31–40	14
41–50	22
51–64	33
Type of physician (%)	
% claims with "usual care" physician	46
% claims with specialist	54
N	110,993

*Sample includes all individuals with at least one claim with a tiered physician in FY2009.
[†]CC = diagnosis in one of the condition categories of the Medicare CMS-HCC models.
[‡]Categories do not sum to 100% because of rounding.

Table 2:   Effect of Tier Status on a Physician's Market Share of New Patients, FY2009–FY2010

	Predicted Market Share of New Patients (%)
All doctors (sample size N = 15,401)	
Top tier	0.57
Average tier	0.57
Bottom tier	0.50*
"Specialist" physicians (sample size N = 12,107)	
Top tier	0.64
Average tier	0.63
Bottom tier	0.56*
"Usual care" physicians (sample size N = 3,294)	
Top tier	0.34
Average tier	0.35
Bottom tier	0.33

Note. Sample includes all tiered physicians with new patients in at least two plans in the fiscal year. Marginal effect based on linear regression of market share on physician tier status, controlling for plan, physician-year, and plan-specialty-year fixed effects. Specialists include allergy/immunology, cardiology, dermatology, endocrinology, gastroenterology, general surgery, neurology, orthopedic surgery, otolaryngology, and rheumatology. "Usual care" includes specialties internal medicine, family practice, OB/GYN, and pediatrics.
*Statistically significant difference from effect of being tiered in the average tier, $p < .05$.

who have a first time visit with a physician of their specialty type in a year. A doctor with a tier-ranking in the bottom tier is predicted to get 0.50 percent of these patients. For specialists, average-tiered specialist physicians are also predicted to have a 0.07 percentage point (or absolute) higher market share of GIC patients who have a first time visit within their specialty type than is a doctor with a tier-ranking in the bottom tier. Thus, *relative* to their average-tiered colleagues, bottom-tiered physicians experience a loss in market share of 12 percent for all physicians (i.e., 0.57–0.50 percent/0.57 percent) and 11% considering specialists only (i.e., 0.63–0.56 percent/0.63 percent; $p < .05$). Analyses of the claims data reveal that these patients saw their new physician an average of three times; patients thus saved an average of $60 ($30) in co-payments if they saw a top-tiered (average-tiered) physician. There was no effect of tier-ranking on the market share of new visits for usual care physicians.

Models analyzing the effect of physician tier-ranking on patient loyalty showed no effect of tier status on the percent of patients who switched to other physicians both when switching is defined as having one visit with a new physician, and when we classified patients as having switched physicians only if they had a minimum of two visits with the new physician in a year.

Switching Plans

Table 3 presents adjusted probabilities that patients with physicians of different tier-ranking switched health plans. Only a small percentage of patients who have a relationship with a physician switched health plans in our study period (2 percent or less in all years); this rate of switching plans is similar, although slightly higher than that of all GIC members. In models of plan switching, patients who saw a physician in the worst-performing tier were significantly more likely to switch health plans following the introduction of tiered networks than were patients who had an existing relationship with an average tiered physician (predicted absolute probability of switching their plan was 2.1 percent vs. 1.2 percent, $p < .01$). This translates to a relative probability of being 75 percent more likely to switch health plans. This result was observed both among patients who have an existing relationship with a

Table 3:   Tier Status and Health Plan Switching

	FY2007 (No Tiered Network)	*FY2009 and FY2010 (Plan Has Tiered Network)*
Health plan switching rates (%)		
All GIC plan enrollees	1.88	1.33
Enrollees with an existing relationship with a tiered physician	2.07	1.49
Predicted probability of switching health plans for patients (%)		
Having one physician any type		
In top tier in current plan	2.0	1.5
In average tier	1.9	1.2
In bottom tier	1.8	2.1**
Having one "specialist" physician who is[†]		
In top tier in current plan	1.6	1.1
In average tier	1.6	1.0
In bottom tier	1.8	1.6*
Having one "usual care" type physician who is[†]		
In top tier in current plan	2.4	2.0
In average tier	2.1	1.4
In bottom tier	1.3	2.6*

Note. Predictd probabilities based on logistic regression of the probability of switching health plans on tier status of a physician seen previously, controlling for patient age, gender, health status, physician specialty, plan, year, and plan-year interactions. "Usual care" includes the specialties internal medicine, family practice, OB/GYN, and pediatrics. "Specialist" includes all other tiered specialities.
*Statistically significant difference from effect of having an average tiered physician, $p < .05$, **$p < .01$.
[†]Sample includes patients who have had two prior visits (one of which occurred in the immediate prior year) with only one physician of any type ($n = 79,628$), of "specialist" type ($n = 41,828$), or of "usual care" type ($n = 36,475$).

specialist (predicted absolute probability of switching of 1.6 percent vs. 1.0 percent, $p < .05$), and among those with a "usual care" physician in the bottom (predicted absolute probability of switching of 2.6 percent vs. 1.4 percent, $p < .05$). There was no effect of having a top-tiered physician (relative to an average tiered physician) on the probability that a patient switched health plans. We also observed no effect of tier-ranking on the likelihood of switching health plans among patients who return to see their physician again versus those who do not see their physician again.

DISCUSSION

It has long been observed that competition among health care providers is weak at best and rarely based on quality or value. Tiered provider networks have been offered to stimulate such value-based competition. Little is known about how tiered networks affect enrollee behavior; our study is the first to our knowledge to look at patient choices between and within multiple networks of tiered providers.

    Overall, we find there is significant loyalty to physicians. Patients who stayed with their plan year to year were no more likely to switch away from lower-tiered physicians than higher-tiered physicians. This finding is in contrast with the evidence on consumers' response to price incentives for prescription drugs, where tiered cost-sharing features lower copayments for more cost-effective drugs and there is strong evidence that consumers respond in part by switching to drugs in the preferred tiers and reducing demand for nonpreferred drugs (Goldman, Joyce, and Zheng 2007). Prescription drugs are very different than physician visits, and drugs are generally viewed as interchangeable, as evidenced by the dramatic and quick reduction in market share experienced by branded pharmaceuticals once a generic substitute becomes available. It is also likely that the importance of trust between patient and physician render copayment differences less effective for influencing choice of providers than for drugs.

    Low rates of switching away from physicians could also be due in part to how patients select physicians in the first place. For example, if patients who are more sensitive to the quality of their doctor also searched harder for physicians before the implementation of the tiered networks, they may have detected the "best" doctors who would ultimately end up in the higher tiers. Other patients, perhaps not prone to care as much about quality or to switch physicians, were thus the ones ending up with doctors who would ultimately

find themselves in the lower tier. Our findings of low switching in the loyalty analysis could thus be interpreted as not providing a large enough financial incentive for these patients to switch. Finally, inertia and low consumer awareness about tiered networks may also contribute to low rates of switching among physicians.

Tiered networks did, however, appear to impact physician market share through the channeling of new patient visits away from the lowest tiered physicians. This impact of tiering on new patient visits is consistent with economic theory and common sense: unknown physicians are more likely to be viewed by patients as substitutable than physicians with whom patients have a relationship. While the absolute magnitude of the numbers presented in Table 3 are small because the "market" includes all doctors of a given specialty and all enrollees in a plan who have a first time visit (e.g., the average "market" of new visits in our analysis is 941 patients, and for specialists, 844 patients), in relative terms, these results are economically important for physicians, as these results correspond to a loss in market share of new GIC patients for a doctor in the bottom tier of 11–12 percent compared to physicians with better tier-rankings.

We observed that the effect of tiering may be at the lower end of the distribution rather than moving patients to the "best" performers. Similar results have been observed in studies of patient response to quality information about individual cardiac surgeons (Wang et al. 2011). These results underscore the loyalty that patients feel for their own physicians. However, both the interpretation of the fact that top-tiered physicians do not appear to gain market share and the study of choice of physicians who patients see as their source of usual care are complicated by issues around access to care. Massachusetts residents have good geographic access to top-tiered physicians (Tackett et al. 2011), but whether these top-ranked physicians, and in particular top-ranked generalist physicians, are accepting new patients is unknown. Further research should investigate whether these findings are indicative of capacity constraints among the top-tiered and usual care physicians (perhaps they are least likely to have open panels), or a sentiment among patients to avoid "poor performing" specialists.

We also observed that few patients switched health plans year to year. Nevertheless, as with choice of new physicians, we identified an increased probability of plan switching among patients who had an existing physician in the worst-performing (high copayment) tier versus an existing physician in a higher tier. The mechanism underlying these plan switches remains unclear. Patients were not switching plans to follow their physician to a plan

where they had a higher tier-ranking, because we do not observe that patients with bottom-tiered physicians who returned to see those physicians again as the ones who were more likely to switch plans. That patients with a previous relationship with a bottom-tiered physician were more likely to switch plans after the implementation of tiering is indicative of greater dissatisfaction with their plan experience with the advent of tiering. Part of this increased dissatisfaction may have been due to the fact that their physician was ranked low by the plan and/or that they were required to pay a high co-payment for their physician visit, but it may also have been the product of a negative experience of care.

This study has several limitations. While the range of employees enrolled in health coverage through the GIC is quite diverse (including all Massachusetts state employees and several municipalities), these findings may not generalize to other populations, in particular, those covered through Medicare and Medicaid. These results may not generalize to tiered networks that impose larger copayment differences across physicians or that tier hospitals. Finally, these findings represent early evidence of consumer response to tiered networks, when our previous survey research has suggested moderate levels of consumer awareness and mixed perceptions about the nature of the information about physicians that is conveyed by tier status (Sinaiko and Rosenthal 2010). Further survey or qualitative research can investigate whether choice of physician changes as consumers become more familiar with the tiered networks in their health plans, providing important contextual information for the interpretation of these findings.

Choosing a provider or a health plan is complicated for patients, and there are many factors and sources of information that patients can take into account when making these decisions. These findings suggest the potential for tiered networks to be one element of this process, and in doing so they can serve as a complement to other, largely payment-based approaches to improving performance. Even if the magnitude of market share shift caused by tiered networks is modest, the threat of long-term market share loss is likely to be a significant force for motivating providers, particularly in a world with increasing downward pressure on health care spending (Landon 2012). Providers may also be motivated to improve their performance because of their own distaste for having a poor tier-ranking. Future research should focus on the extent to which tiered networks cause providers to improve performance. It will also be critical to examine the extent to which unintended consequences such as avoidance of high-risk patients need to be weighed against the benefits of tiering.

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NOTES

1. For more information, see http://www.resolutionhealth.com/.
2. From here forward in the paper, use of the terms "efficiency" and "quality" to describe provider performance will refer to these definitions.
3. Methodology for assignment of unique ID and specialty code to providers across plans is based on a proprietary algorithm created and implemented by the GIC and its data vendors. Unique ID is based on National Provider Identifier, demographics, and other data from the National Plan and Provider Enumeration System. Provider specialty is assigned based on information on provider specialty submitted by the health plans. GIC health plans review and validate the results of provider linking and specialty assignment on an annual basis.
4. For physicians in our data with missing information on specialty (<1 percent of claims), we assigned them to the specialty from which they billed the majority of their claims (at least 50.5 percent).
5. Office visits are claims with CPT codes: 99201–99205, 99211–99215, 99381–99390, 99391–99405, 99241–99245, 99406–99409, 99410–99429, 99246–99255, 99354–99355.
6. FY2008 is omitted because tiered networks only included two tiers.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.
Table S1: Tiered Specialties by Plan, FY 2008–FY2010.